a switch engine that determines whether said first record exists in said flow table when said layer 2 flow is detected, and whether said second record exists in said flow table when said layer 3 flow is detected.

Kindly add the following new claim:

45. (New Claim) An apparatus according to claim 1, wherein said second packet is a unicast packet.

46. (New Claim) An apparatus according to claim 44, wherein said second packet is a unicast packet.

REMARKS

Following entry of the above amendments, claims 1-25 and 27-46 are presently pending in the application. The Examiner indicated that claims 11-25 and 27-43 are allowable over the art of record. The Examiner further objected to claims 2, 3, and 5-7 as being dependent upon a rejected base claim, but indicated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.

Applicants thank the Examiner for reviewing the art of record and for further considering the previously pending claims. Applicants have added new claims 45 and 46 to particularly point out additional patentable features of Applicants claimed invention. Applicants have amended claims 1 and 44 to clarify and better characterize features of Applicants claimed invention and to place the claims in condition for allowance. Applicants respectfully submit that the claims as

presently pending are allowable and respectfully request reconsideration and allowance of the presently pending claims.

Prior Art Rejection of Claims 1, 4, and 8-10 As Anticipated By Bare

Claims 1, 4, and 8-10 stand rejected under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent No. 5,920,699 to Bare ("Bare"). For reasons set forth more fully below, this rejection is respectfully traversed.

Bare Does Not Disclose Or Suggest Forwarding Packets Between Hosts In Accordance With Records in A Common Flow Table That Correspond Layer 2 And Layer 3 Addresses With Ports Associated With The Hosts As Required By Independent Claim 1

Independent claim 1, as amended, requires:

1. An apparatus for forwarding packets between ports, said ports associated with hosts having one or more of a layer 2 address, a layer 3 address and a socket number, said apparatus comprising:

a flow table having a plurality of records;

a switch module coupled to said ports and said flow table, said switch module comprising:

means for forwarding a first packet between a first host and a second host **in accordance with a first record in said flow table that corresponds said layer 2 addresses** of said first and second hosts **with ports associated with said first and second hosts**, and

means for forwarding a second packet between a third host and a fourth host **in accordance with a second record in said flow table that corresponds said layer 3 addresses** of said third and fourth hosts **with ports associated with said third and fourth hosts**.

The Office Action mailed November 22, 2000 apparently takes the position that the Application Specific Integrated Circuit (ASIC) 101 in combination with the Virtual Switching Engine (VSE) 102 corresponds to the claimed switch module. However, the claim requires one switch module that is coupled to the ports and the flow table. The Examiner cannot pick and

choose one element from a reference for meeting certain limitations of a claim and another element from the reference for meeting certain other limitations of the same claimed element.

In any event, as will become more apparent from the discussion below, neither the ASIC 101 nor the VSE 102, alone or in combination together, simultaneously meet all the limitations of the switch module of amended claim 1. Further, one skilled in the art would not have been motivated to combine the ASIC 101 and the VSE 102 together as alleged in the Office Action, given Bare's explicit teaching that the VSE 102 and the ASIC 101 perform separate switching decisions as explained in more detail below.

The VSE 102 of Bare Is Not The Switch Module Of Amended Claim 1

The VSE 102 Makes Switching Decisions <u>Outside</u> Of the ASIC 102

Bare does not disclose or suggest a switch module as required by amended independent claim 1. Rather, Bare discloses the switching ASIC 101, the VSE 102, a MAC address lookup table 104, and an ARP cache 103. The ASIC 101 looks up MAC addresses in the MAC address lookup table 104 that the ASIC 101 has previously obtained and forwards unicast packets to the addresses using level 2 switching (Bare, col. 3, lines 12-16). When the ASIC 101 discovers a packet that is a broadcast or unknown address packet, the packet is forwarded to the VSE 102 (Bare, col. 3, lines 16-18, col. 8, lines 3-5). **The VSE 102 is a CPU that makes switching decisions *outside* of the switching ASIC 101 and looks at the level 3 address of a packet (Bare, col. 3, lines 18-20, col. 8, lines 3-5).** The VSE 102 keeps track of any unknown addresses in the ARP cache 103 and forwards the packet back to the ASIC 101 for delivery out the appropriate ports (Bare, col. 3, lines 21-23). The VSE 102 thus performs level 3 processing of

broadcast and unknown address packets. While waiting for an answer to the packet, the VSE 102 marks the ASIC's 101 MAC address lookup table 104 to indicate that the originator host of the packet exists and to what port the originator host is connected (Bare, col. 3, lines 23-26). Once the VSE 102 sees the response to the packet (forwarded to the VSE 102 by the ASIC 101 from the appropriate port 105), the VSE 102 again marks the ASIC's MAC address lookup table 104, indicating what port the answering host is on (Bare, col. 3, lines 26-29). The VSE 102 answers broadcast packets by proxy for all known addresses without forwarding any of the packets down the VLANs (Bare, col. 3, lines 29-31).

Bare does disclose forwarding unknown *combinations* of source and destination MAC addresses to the VSE 102 to control access between hosts (Bare, col. 25, lines 19-23) but the end result is still that level 2 switching of unicast packets is performed by the ASIC 101 once the source destination combination is allowed by the VSE 102.

The ASIC 101 Is Not Coupled To The ARP Cache 103 And Does Not Forward Packets In Layer 3 And Is Not The Switch Module Of Claim 1

The MAC Address Lookup Table Is A Layer 2 Table By Definition And Is Not The Flow Table Of Claim 1

Although Bare discloses that the switching ASIC 101 performs level 3 and unicast (level 2) switching (Bare, col. 3, lines 11-12), after inspection of FIG. 1 and the Bare reference, Applicants can find no instance where Bare discloses the ASIC 101 switching packets according to level 3 addresses. Rather, the ASIC 101 forwards packets between ports once the MAC addresses for the source and destination are known to the ASIC 101 from the MAC address look up table 104, with the possible caveat that access between the particular *combination* of MAC

addresses is allowed by the VSE 102. This is level 2 switching of packets. The ultimate goal of Bare appears to be achieving a situation where packets can be forwarded between ports by the ASIC 101 according to the MAC (level 2) addresses of the source and destination. This situation is achieved by learning the MAC address information of hitherto unknown sources and destinations of packets and facilitating this learning by conducting level 3 processing of broadcast and unknown address packets using the VSE 102 in a way that frees the VLAN bandwidth from excessive broadcast/flooded traffic (Bare, column 3, lines 8-31; col. 13; Abstract).

The ASIC 101 is not the switch module of amended claim 1. The ASIC 101 is not coupled to the ARP cache 103. Rather, the ASIC 101 is coupled to the ports 105 and to the MAC address lookup table 104, which, by definition, is a layer 2 address table. The ASIC 101 forwards unicast packets according to layer 2 MAC addresses. Broadcast packets and packets with unknown addresses are forwarded to the VSE 102 for processing to prevent flooding all ports.

The VSE 102 is not coupled to the ports 105 and is not the switch module of claim 1

Referring to FIG. 1, the ASIC 101 is coupled to a plurality of network ports 105. Although the VSE 102 is coupled to the ASIC 101, the VSE 102 is not connected to the ports 105.[1] By inspection of FIG. 1, the ARP cache 103 and the MAC address lookup table 104 are separate from each other, and do not form a common flow table. Since the ASIC 101 is coupled

[1] The Examiner may be misled by the statement at Bare, col. 3, lines 9-11 that "the invention comprises a switching Application Specific Integrated Circuit (ASIC) 101 and a Virtual Switching Engine (VSE) 102 connected to a plurality of ports 105." The implication is that the VSE is connected to the ports 105. Similarly, the statement that "the switching ASIC 101 performs level 3 201 and unicast (level 2) switching 203" is misleading and mischaracterizes what Bare discloses.
One skilled in the art would understand, from inspection of FIG. 1 and the rest of the disclosure of the patent that the VSE 102 is in no way connected to the ports 105, and that the ASIC 101 performs only level 2 switching.

to the ports 105 and is only directly coupled to the MAC address lookup table 104, the ASIC 101 is not a switch module that is coupled to ports and that performs forwarding of packets in accordance with layer 2 and layer 3 addresses and respective records from the same flow table.

The VSE 102 is not the switch module of amended claim 1. The VSE 102 is coupled to the ARP cache 103, which includes layer 2 and layer 3 address information (Bare, col. 4, lines 13-14; col. 8, lines 13-15), but the VSE 102 is not coupled to the ports 105 and does not forward packets between hosts or between ports. Rather, the VSE 102 is a CPU that makes switching decisions *outside* of the switching ASIC 101 (Bare, col. 3, lines 18-20, col. 8, lines 3-5).

The ARP cache 103 is not coupled to the ASIC 101 and is not the flow table of claim 1

The ARP cache 103 is not the flow table of amended claim 1. The ARP cache 103 is not coupled to the ASIC 101, which forwards unicast packets between ports according to layer 2 MAC addresses. The MAC address table 104 is not the flow table of amended claim 1. The table 104 Bare does not disclose or suggest coupling the ARP cache 103 to the table 104, integrating the ARP cache 103 with the table 104, or combining the ARP cache 103 with the table 104. Applicants respectfully submit that it is not a matter of design choice whether to couple, integrate, or combine the ARP cache 103 with the table 104. Bare discloses a conventional routing table (ARP cache 103) and a conventional switch table (MAC address lookup table), separate from one another and thus does not disclose or suggest a common flow table.

In summary, amended independent claim 1 is allowable for at least the following reasons:

Bare does not disclose or suggest a switch module that is coupled to ports and that forwards packets in accordance with a record in a flow table that corresponds layer 3 addresses of hosts with a ports associated with the hosts, as required by amended claim 1.

Bare does not disclose or suggest a flow table that includes both the first and second records of amended claim 1.

Bare does not disclose or suggest a switch module that is coupled to ports and that forwards packets in accordance with a flow table that includes both the first and second records of amended claim 1.

Accordingly, Applicants submit that amended independent claim 1 is allowable over the art of record. Previously rejected claims 4 and 8-10, objected to claims 2, 3, and 5-7, and new claim 45 all ultimately depend from amended independent claim 1. The allowability of claims 2-10 and 45 thus follows from the allowability of amended claim 1; as such, claims 2-10 and 45 are allowable over the art of record.

Prior Art Rejection of Claim 44 As Anticipated By Bare

Claim 44 stands rejected under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent No. 5,920,699 to Bare ("Bare"). For the reasons set forth above with respect to amended claim 1 and reiterated below, this rejection is respectfully traversed.

<u>Bare Does Not Disclose Or Suggest Forwarding Packets Between Hosts In Accordance With Layer 2 And Layer 3 Addresses And Records In A Common Flow Table As Required By Independent Claim 44</u>

Independent claim 44, as amended, requires:

44. An apparatus for forwarding packets between ports, said ports associated with hosts having one or more of a layer 2 address, a layer 3 address and a socket number, said apparatus comprising:

a flow table having a plurality of records;

a switch module coupled to said ports and said flow table, said switch module comprising:

means for detecting layer 2 flow arriving from a first host and **for forwarding** a first packet between the first host and a second host **in accordance with a first record in said flow table that corresponds said layer 2 addresses** of said first and second hosts **with ports associated with said first and second hosts**,

means for detecting layer 3 flow arriving from a third host and **for forwarding** a second packet between the third host and a fourth host **in accordance with a second record in said flow table that corresponds said layer 3 addresses** of said third and fourth hosts **with ports associated with said third and fourth hosts**, and

a switch engine that determines whether said first record exists in said flow table when said layer 2 flow is detected, and whether said second record exists in said flow table when said layer 3 flow is detected.

As regards amended claim 44, the switch module further includes a switch engine that determines whether the first record exists in the flow table when layer 2 flow is detected and whether a second record exists in said flow table when said layer 3 flow is detected. The Virtual Switching Engine 102 disclosed by Bare is not the switch engine of Applicants' amended claim 44. Rather, the ASIC 101 determines whether or not MAC addresses (layer 2) corresponding to a particular flow are present in the MAC address lookup table 104, which includes MAC addresses (layer 2). Bare does not disclose or suggest that the MAC address lookup table contains layer 3 addresses or records.

The VSE 102 is most analogous to the Applicants' CPU that intervenes when layer 2 or layer 3 flow information, such as a destination address, is not found in the flow table, or when routing of packets between different networks is required. Following update of the flow table by the CPU, the multiprotocol switch forwards, switches, and routes packets at wire speed at layer 2 or layer 3 within a network or between networks, as applicable. Again, a common flow table is

used for both layer 2 and layer 3 forwarding. Bare does not disclose or suggest the use of the same, or a common, flow table for both layer 2 and layer 3 forwarding. Rather, the ASIC 101 performs the forwarding of unicast packets between the ports 105 using MAC (layer 2) addresses of the source and destination. Bare discloses an ARP cache 103 with a well-known routing table for routing of layer 3 packets. Bare also discloses a MAC address lookup table 104 but does not disclose or suggest a common layer 2 and layer 3 flow table coupled to a switch module, nor does Bare disclose or suggest combining or integrating the functions of the ARP cache 103 and the MAC address lookup table 104 together to form a common flow table that, coupled to the switch module, is used for layer 2 and layer 3 forwarding. It is clear from Bare that the flow table of amended independent claim 44 is not disclosed or suggested therein.

Accordingly, Applicants submit that amended independent claim 44 is allowable over the art of record.

Allowable Subject Matter

The Examiner further objected to claims 2, 3, and 5-7 as being dependent upon a rejected base claim, but indicated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims. For these reasons and for at least the reasons presented above with regard to allowability of the independent claims to which these claims respectively depend, Applicants respectfully submit that claims 2, 3, and 5-7 are allowable.

Newly Added Claims

New claim 45 is dependent on amended claim 1 and recites that the second packet of amended claim 1 is a unicast packet. A unicast packet, as is well known to those skilled in the art, is a directed packet having a single destination. A unicast packet can be switched according to layer 2 flow or to layer 3 flow. New claim 45 further distinguishes Applicants' claimed invention over Bare. No new matter has been added.

Similarly, new claim 46 is dependent on amended claim 44 and recites that the second packet of amended claim 44 is a unicast packet. New claim 46 further distinguishes Applicants' claimed invention over Bare. No new matter has been added.

Consistent with the arguments presented above, Applicants believe new claims 45 and 46 to be allowable over the art of record and respectfully request entry and consideration of new claims 45 and 46.

Amended Claims

While Applicants believe that the previously pending claims are patentable over the art of record and particular distinguish over Bare, the Applicants have amended independent claims 1 and 44 to clarify and better characterize features of Applicants claimed invention and to place the claims in condition for allowance. Amended claims 1 and 44 now recite that the first record in the flow table corresponds layer 2 addresses of the first and second hosts with ports associated with the first and second hosts, and that the second record in the flow table corresponds layer 3 addresses of the third and fourth hosts with ports associated with the third and fourth hosts. The amendments are consistent with Applicants' specification. No new matter has been added.

Applicants respectfully request entry of the above amendments. Following entry of the above amendments, Applicants respectfully submit that claims 1-25 and 27-46 are allowable over the art of record and ask for reconsideration and an allowance of the aforementioned claims.

Conclusion

Having fully and succinctly addressed every objection and rejection identified in the Office Action with the above amendments, it is submitted that this application is in condition for allowance. A Notice to that effect is earnestly solicited.

Respectfully submitted,

PILLSBURY MADISON & SUTRO, L.L.P.

By _____

Christopher D. Agnew
Registered Patent Agent
Reg. No. 43,464
Tel. No.: (650) 233-4609
Fax No.: (650) 233-4545

CDA/jw
1100 New York Avenue, N.W.
Ninth Floor, East Tower
Washington, D.C. 20005-3918
(202) 861-3000

I certify that this paper is being deposited for delivery via First Class mail to the U.S. Patent Office, Attn Assistant Commissioner for Patents, with appropriate postage affixed thereto, on February 16, 2001.

_____
Jeanette Walker-Cooks